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FOOD INSECURITY AND CHILD AND PARENT/CARETAKER OVERWEIGHT/OBESITY  
IN A RURAL, APPALACHIAN MISSISSIPPI COMMUNITY

A Thesis

Presented for the

Master of Science

Degree

The University of Mississippi

Sydney Antolini

May 2018

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## ABSTRACT

This study examined the differences in parent/caretaker body mass index (BMI) and parent/caretaker-reported child overweight/obesity by food security status in a rural, Appalachian, Mississippi community, as well as the relationship of parent/caretaker BMI and parent/caretaker-reported child overweight/obesity to food security status. A cross-sectional survey of elementary school parents/caretakers recruited at three elementary schools in an economically-distressed Appalachian, Mississippi county was conducted. Parent/caretaker BMI was calculated from self-reported height and weight. Caretaker-reported child overweight/obesity was determined using caretaker report of a medical professional identifying child overweight/obesity within the past year. Data were analyzed using IBM SPSS (version 23, 2015) to assess for differences in parent/caretaker BMI and caretaker-reported child overweight/obesity by food security status (ANOVA, Independent Samples T-test, Pearson Chi Square), as well as the relationship of food security to BMI and child overweight/obesity (Pearson  $r$  and Kendall's  $\tau_b$  correlations). Parent/caretaker participants ( $n=467$ , 41% response rate) were  $34\pm 8$  years and predominantly Caucasian ( $n=264/465$ , 57%), female ( $n=425/461$ , 92%), married ( $n=243/453$ , 54%), with some college or higher education ( $n=256/461$ , 56%), and living in food-secure households ( $n=367/455$ , 80%). Parent/caretaker BMI differed by food security status ( $p=.02$ ), with those from food-insecure households having a significantly higher BMI ( $31.7\text{kg/m}^2\pm 8.0\text{ kg/m}^2$ ) than those from food-secure households ( $29.2\pm 7.2$ ). Parent/caretaker BMI was greater in food-insecure households, but prevalence of caretaker-

reported child overweight/obesity was greater in food-secure households (6.8%), compared to food-insecure households (1.1%). Exploring nutrition interventions, especially in a community hub (e.g., school), that may help to alleviate household food insecurity is warranted.

## LIST OF ABBREVIATIONS AND SYMBOLS

ARC	Appalachian Regional Commission
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
COWOB	Childhood Overweight and Obesity
MS	Mississippi
NHANES	National Health and Nutrition Examination Survey
USDA	United States Department of Agriculture

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## CHAPTER I

### INTRODUCTION

As the prevalence of non-communicable, chronic diseases in Mississippi, instigated by over- and under-nutrition, is greater than that of the entire United States, obesity and poor produce intake is largely to blame (Short, 2014). Simultaneously, food insecurity rates of Mississippi households are greater than the national average and a large number of households include those with children (Coleman-Jensen, Rabbitt, Gregory & Singh, 2017). Many children living in rural, food-insecure households may be exceeding their daily caloric intake, but are not getting adequate nutrients for healthy growth and development (Tovar, Chui, Hyatt, & Kuder, 2012). Since the Centers for Disease Control and Prevention (CDC) reports that more than 15.4 percent of adolescents (ages 12-17) and 14.8 percent of young children (ages 2-4) in Mississippi are overweight or obese (2016), there is a critical need to understand what indicators contribute to these startling percentages. At the time of this study, Mississippi had the highest rates of both food insecurity and obesity in the United States, yet a specific region of Mississippi sits in Appalachia (Coleman-Jensen et al., 2017). The relationship between food insecurity and obesity has been shown to have an association in portions of Appalachia, but Mississippi is not included in current research (Pheley, Holben, Graham, & Simpson, 2002; Dolstad, Woodard, Green, & McSpirit, 2016). Further, as compared to other portions of the country, people in the

Appalachian region have an increased risk for chronic diseases, such as heart disease, obesity, and diabetes, while there is also a strong correlation between food security status and chronic health conditions among adults living below the federal poverty line (Halverson & Harner 2004; Gregory & Coleman-Jensen, 2017). The purpose of this research was to determine the differences in parent/caretaker BMI and parent/caretaker-reported child overweight/obesity by food security status in a rural, Appalachian, Mississippi community, as well as the relationship of parent/caretaker BMI and parent/caretaker-reported child overweight/obesity to food security status. Table 1 summarizes the research questions and associated hypotheses.

Table 1

*Research Questions and Hypotheses*

Question	Hypothesis
Does parent/caretaker BMI differ between household adult food security groups?	BMI will differ between parent/caretakers living in high, marginal, low, or very-low food security groups.
Does parent/caretaker BMI differ between parent/caretakers living in food-secure and food-insecure households?	BMI will differ between parent/caretakers living in food-secure and food-insecure households.
Does parent/caretaker BMI differ between parent/caretakers living in fully food-secure households and not fully food-secure households?	BMI will differ between parent/caretakers living in fully food-secure households and not fully food secure households.
Does the prevalence of parent/caretaker-reported child overweight/obesity (COWOB) differ between food-secure and food-insecure households?	The prevalence of COWOB will differ between food-secure and food-insecure households.
Does the prevalence of parent/caretaker-reported COWOB differ between fully food-secure and not fully food households?	The prevalence of COWOB will differ between fully food-secure and not food-secure households.
Is there an association between household adult food security scale score and parent/caretaker BMI?	There is an association between household adult food security scale score and parent/caretaker BMI.

Is there an association between household adult food security scale score and COWOB?

There is an association between household adult food security scale and COWOB.

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## CHAPTER II

### LITERATURE REVIEW

#### **Introduction**

The state of Mississippi has some of the highest rates of both food insecurity and obesity in the United States (Coleman-Jensen et al., 2017). A specific region of Mississippi sits in Appalachia and the relationship between food insecurity and obesity has been shown to have an association in portions of Appalachia (BRFSS, 2015; Holben, Zurmehly, Jackson, & Holcomb, 2009), yet Mississippi has not been included in its Appalachian context. The purpose of this research was to determine the differences in parent/caretaker BMI and parent/caretaker-reported child overweight/obesity by food security status in a rural, Appalachian, Mississippi community, as well as the relationship of parent/caretaker BMI and parent/caretaker-reported child overweight/obesity to food security status.

#### **Food Insecurity**

**Definition of Food Insecurity.** Food security is defined as the access by all people, at all times, for enough food for an active, healthy life. The USDA has prescribed ranges, or categories, for food security and food insecurity. Food security includes High Food Security, which indicates no reports of food access problems or limitations in the past year, and Marginal Food Security, which indicates one or more reports of anxiety over food sufficiency or shortage of food in the house, but no change in diet or food intake in the past year. Food Insecurity

includes Low Food Security, which indicates reports of reduced quality, variety, or desirability of diet, but with little to no reduced food intake in the past year, and Very Low Food Security, which indicates multiple reports of disrupted eating patterns and reduced food intake in the past year. Additionally, new standards have categorized households as Fully Food Secure, in which households have high food security, or Not Fully Food Secure, which includes households who have marginal, low, or very low food security (USDA Definitions of Food Security, 2016).

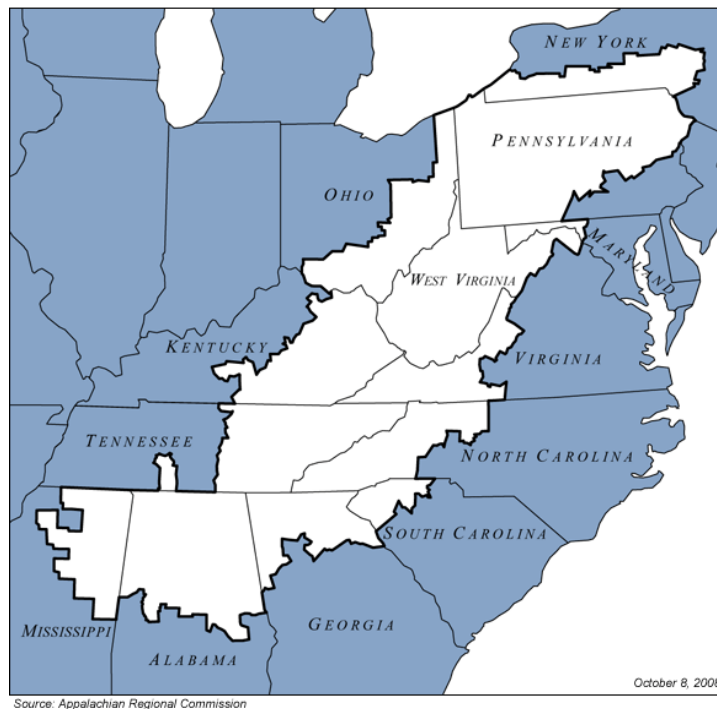
Appendix A summarizes the categories of household food security.

**Prevalence of Food Insecurity in the United States and Mississippi.** In 2016, it was estimated that 12.3 percent of households in the United States were food insecure sometime during the year, including 7.4 percent that experienced low food security and 4.9 percent that experienced very low food security (Coleman-Jensen et al., 2017). In Mississippi, according to 2014-2016 data, 18.7 percent of households were food insecure, with 6.9 percent of those households experiencing very low food security (Coleman-Jensen et al., 2017). As Mississippi holds the highest food insecurity rate of the United States, it is important to consider how adults and children residing in Mississippi are affected by the lack of access to enough food. Furthermore, while a portion of Mississippi sits in the Appalachian region, food insecurity has been shown to be associated with poor health status in parts of Appalachia (Pheley, Holben, Graham, & Simpson, 2002). While food security is important for the health and productivity of an adult, it is essential for children, as nutritional intake affects their current physical and mental well-being, social development, and future physical health (Connell, Lofton, Yadrick, & Rehner, 2005).

**The Appalachian Region.** The Appalachian region of the United States follows the

spine of the Appalachian mountains from southern New York to northern Mississippi (Figure 1).

Figure 1. *The Appalachian Region (2008)*



While 40 percent of this region is considered rural, as compared to 20 percent of the national population, most communities rely on mining, forestry, and agriculture to sustain their economies (“The Appalachian Region,” 2017). With varying degrees of economic risk subsist in each community, Calhoun County, Mississippi, holds a ‘distressed’ status, meaning it holds the highest rank of a composite value, based on three-year average unemployment rate, per capita market income, and poverty rate (County Economic Status Classification, 2017).

**Prevalence of Food Insecurity in Appalachia.** While food insecurity has been identified in specific parts of Appalachia, food insecurity as a whole is difficult to determine over such a wide and diverse area using current methods for estimates. The Appalachian Regional



Commission (ARC), which is the regional development agency that represents the 13 Appalachian states, gathers data and statistics in regards to each county's economic status, education, income, population, poverty, and unemployment. The agency's data set, however, does not consider food security status or health outcomes, such as weight status. A study conducted by Pheley, Holben, Graham, & Simpson (2002) found that 23 percent of respondents in a rural, Appalachian Ohio community were food insecure at some point in the year, as compared to 10 percent of the national average in that same year. A similar study conducted in a rural, Appalachia Kentucky community, reported that 23 percent of households were classified as food insecure at some point during the year (Dolstad, Woodward, Green, & Mcspirit, 2016). Furthermore, as compared to other portions of the country, people in the Appalachian region have an increased risk for chronic diseases, such as heart disease, obesity, and diabetes, while there is also a strong correlation between food security status and chronic health conditions among adults living below the federal poverty line (Halverson & Harner 2004; Gregory & Coleman-Jensen, 2017). In the state of Mississippi, seven of the leading causes of death are chronic disease-related, including heart disease, cancer, chronic obstructive pulmonary disease, stroke, Alzheimer's, diabetes, and kidney disease (Short, 2014).

**Food Insecure Household Characteristics.** According to the USDA, households with children have a substantially higher rate of food insecurity (16.5 percent), compared to those without children (10.5 percent). The USDA also reports that the prevalence of food insecurity in households with children headed by a single woman is 31.6 percent, while households with children headed by a single man is 21.7 percent. In addition, from a regional perspective, food insecurity rates are highest in the South at 13.5 percent, compared to the Northeast (10.8

percent), West (11.5 percent), and Midwest (12.2 percent) (Coleman-Jensen et al., 2017). As Mississippi sits in the deep, rural south, regional considerations contribute to the discussion of food insecurity and could have an effect on how food insecurity is viewed and culturally defined.

**Other Causes of Food Insecurity.** As food insecurity is a complex issue, there are a variety of reasons why a household could be experiencing a lack of sufficient food. In the United States, poverty and unemployment are the largest contributors to household food insecurity (Nord, 2009). The poverty rates for 2011-2015 of Appalachia (17.1 percent) and Calhoun County (25.9 percent) are well above the poverty rates of the United States (15.5 percent). As previously noted, Calhoun County is classified as a ‘distressed’ county (Appalachian Regional Commission, 2015; County Economic Status Classification, 2017). Therefore, instances of food insecurity in this county may be higher. Furthermore, Calhoun County, Mississippi has a child persistent poverty designation, classified by 20 percent or more of the children 18 and under being poor, measured in the 1980, 1990, and 2000 decennial census, and a rural-urban continuum code designation of 9, in which the area is completely rural and not adjacent to any metro areas (Parker, 2017; Parker, 2013).

**Formulation of Food Insecurity Module.** In response to increasing hunger in the United States, the National Nutrition Monitoring Act of 1990 initiated the Food Security Measurement Project. This ongoing project includes the collaboration of federal agencies, academic researchers, and private/commercial and non-profit organizations to formulate a methodology for determining food security status in households (USDA History and Background, 2017). The project released the Food Security Core Survey Module, or Core Module, that includes an 18-item set of indicators that measures the food security status of households. The module includes

questions related to 1) anxiety related to food budget or supply and whether the budget meets basic needs; 2) experiences related to running out of food without the money to obtain more; 3) perceptions of intake for both themselves and other members of the household; 4) adjustment to normal food use, substituting fewer or cheaper food items; 5) instances of reduced food intake by adults in the household and consequences of reduced intake such as physical hunger or weight loss; and 6) instances of reduced food intake, or consequences for children in the household (Bickel, Nord, Price, Hamilton, & Cook, 2000). Responses are utilized to assign a scale score indicating household severity, or category, of food insecurity (Appendix A).

**Food Insecurity and Parent/Caretaker Obesity.** The environment that food insecurity creates has a direct health effect on the individuals living in that household, namely the adults. A study conducted by Pan, Sherry, Njai, and Blanck (2012) looked at the association between food insecurity and weight status within 12 states in the United States. Food-insecure adults had a 32 percent increased odds of being obese, compared to food-secure adults. Further, food-insecure population subgroups of adults ages greater than 30 years, women, non-Hispanic whites, non-Hispanic blacks, adults with some college education or a college degree, and adults with none or two children in their households had a higher prevalence of obesity than food-secure adults. While single adults living in food-insecure households only have to care for themselves, households with children have an added pressure to provide food for multiple people in the household. The weight status of those adults, however, still follows a particular trend towards increased overweight/obesity, but none of the states included were in the Appalachian region. One study conducted by Holben & Pheley (2006), specifically included adults from Appalachian, Ohio, and found that those from food-insecure households had higher BMIs, rates of obesity, and

self-reported rates of diabetes than those from food-secure households, but did not specify these adults as parents/caretakers. Bruening, MacLehose, Loth, Story, and Neumark-Sztainer (2012) assessed food security and weight status in over 2,000 parents with adolescent children in Minnesota, finding that almost 39% of parents and caregivers experienced household food insecurity and 13 percent experienced very low food security. Of those experiencing food insecurity, there was a significant association with poor nutrition, such as higher rates of parental overweight/obesity and higher rates of binge eating. With added stressors on the caregiver, the probability of the child or adolescent experiencing increased weight status increases as well. Lohman, Stewart, Gunderson, Garasky, and Eisenmann (2009) found that in youth, ages 10-15, there was higher probability that the adolescent would be overweight or obese if there was added stress on the mother in the household, in relation to food insecurity. Although parents and caregivers may attempt to prevent the consequences of food insecurity from affecting the children or adolescents in the household, adverse effects seem almost inevitable.

**Food Insecurity and Child Obesity.** While food insecurity and parental/caretaker obesity has been largely researched, the consequences of food insecurity transfer to the children living in those food-insecure households. As parents and caretakers struggle to provide wholesome food and complete meals, the children in the household rely on fast food or convenience foods. Windome, Neumark-Sztainer, Hannan, Haines, and Story (2009) found that food-insecure high school students reported eating more fast food were more likely to perceive that eating healthfully was not convenient, and they had fewer family meals per week than food-secure students. Those same food-insecure students were more likely to have a BMI above the 95<sup>th</sup> percentile (Windome et al., 2009).

In utilizing data from the National Health and Nutrition Examination Survey (NHANES), current research has focused on food security and weight status in older children/youth and adolescents. In youth ages 12-18 years, Holben and Taylor (2015) found that those from marginally-food secure and low-food secure households were significantly more likely than food-secure youth to be overweight, while those from marginally-secure households were 1.3 more times likely to be obese. A similar study conducted by Ngyuen, Ford, Yarock, Shuval, and Drope (2016) utilized data from NHANES on youth ages 9-17, finding that BMI percentile in children from households with low food security was significantly higher than that of children from fully food-secure households. Further, a study conducted by Alaimo, Olson, Frongillo, and Briefel (2001) on a nationally representative sample of youth 2-16 years (NHANES data) found that younger food-insufficient girls were less likely to be overweight, and non-Hispanic white older food-insufficient girls were more likely to be overweight than food-sufficient girls. While most research studies have utilized NHANES data to assess for overweight and obese youth living in food-insecure households, little research has focused on the Appalachian region or included both parental and child weight status against food security status.

**Geographic Indicators of Obesity.** Different geographic regions (i.e. rural vs. urban) reveal varying rates of obesity and risk factors specific to each region. In rural areas, systematic review reveals that children living in rural areas have a 26 percent greater risk of obesity, than those living in urban areas (Johnson, 2015). Further, living in metropolitan counties is significantly associated with lower odds of being obese (Chen, Jaenicke, & Volpe, 2016). A study conducted by Liu, Jones, Sun, Probst, Merchant, and Cavicchia (2012), on 14,332 children ages 2-19, found that proportionately more rural than urban children were overweight/obese

(35.4 percent versus 29.3 percent) and obese (18.6 percent versus 15.1 percent). Even after adjusting for sociodemographic, health, diet, and exercise factors, rural children still had 30 percent higher odds of being overweight/obese than urban children (Liu et al., 2012). While 58 percent of the population in Mississippi is considered rural, there is a higher likelihood that the households in those rural regions and counties of the state are overweight and/or obese as well (Cromartie & Bucholtz, 2000). Additionally, higher rates of obesity than the national average have been identified in other parts of rural Appalachia, such as West Virginia (Pancoska, Buch, Cecchetti, & Parmanto, et. al, 2009).

### **Definition of Obesity**

Adult obesity has continued to rise across the United States, with Mississippi having one of the highest rates of obesity at 35.6 percent (BRFSS, 2015). The CDC defines adult obesity by BMI, in which a BMI of 25-30 is classified as overweight, a BMI of 30-35 is classified as obese class 1, a BMI of 35 to 40 is classified as obese class 2, and a BMI over 40 is classified as obese class 3 or ‘extreme/severe’ obesity.

According to the CDC, a child is considered overweight when their BMI is at or above the 85th percentile and below the 95th percentile for children/teens of the same age and sex, while obesity is defined as a BMI at or above the 95th percentile for children/teens of the same age and sex. Using these definitions, it is estimated that between 2011-2014, 17.5 percent of children (ages 6-11) and 20.5 percent of adolescents (ages 12-19) living in the United States were obese, with these numbers predicted to increase (Ogden, 2015). As obesity in children and adolescents has nearly tripled in the last 30 years, government leaders, school administrators, and health professionals are trying to understand and identify the indicators of this increase.

**Identifying Obesity.** While the most accurate measure to identify child/adolescent obesity is through direct measurement of height and weight (to calculate BMI), this method is not always tangible. Therefore, in order to assess the prevalence of childhood overweight and obesity over a specific area (both on a small or large scale), different measurements have been utilized. Some school systems have measured BMI at school, but take-home surveys are the most practical way to measure for BMI over a large population (Stalter, Chaudry, & Polivka, 2010). While it is practical, there is bias in utilizing take-home surveys. Furthermore, parents and caregivers often inaccurately assess the weight status of their children and rely on their children's appearance and/or doctors' visits to assess for height and weight (Alexander et al., 2014). Therefore, it is crucial to not rely on parental/caregivers analysis, but rather, that of a professional.

In a similar respect, self-reported height and weight is the most practical method to assess adult weight status and BMI. While adults tend to overestimate height and underestimate weight in self-reported surveys, it is the most efficient and cost-effective method to collect a large amount of data in a given population and provide BMI estimates (Elgar & Stewart, 2008). Furthermore, the increase in obesity rates over the last decade, which have been based on self-reported height and weight, likely reflect actual weight increases and are not inflated by changes in reporting accuracy (Hattori & Sturm, 2013). While self-reported height and weight is not necessarily ideal for calculating BMI for adults, the bias has remained stable and is still an acceptable method to assess weight status in a large population using take-home surveys.

## **Conclusion**

While child obesity, parent/caretaker obesity, and food insecurity have all been heavily researched on their own, there is a discrepancy in the collection of data and is often a generalization on the entire U.S. region. By localizing a specific area of the United States, rural, Appalachian, Mississippi, and including both child and parent/caretaker obesity against the prevalence of food security, is something that has not been explored or developed.



## CHAPTER III

### METHODOLOGY

The purpose of this research was to determine the differences in parent/caretaker BMI and parent/caretaker-reported child overweight/obesity by food security status in a rural, Appalachian, Mississippi community, as well as the relationship of parent/caretaker BMI and parent/caretaker-reported child overweight/obesity to food security status.

#### **Institutional Review Board Approval and Research Design**

This one-group cross sectional survey was by approved by the Institutional Review Board at the University of Mississippi prior to data collection. The school district and administrators agreed to participate in the research. This research utilized data from the Farm-to-YOUth! phase 1 dataset.

#### **Setting and Participants**

Perspective participants for this study were 1,144 parents/caretakers with children attending three elementary schools in rural, Appalachian, Mississippi, during October, 2016. The schools were located in Calhoun County, Mississippi, which is a designated as ‘distressed’ by the Appalachian Regional Commission (2015), based upon poverty and economic indicators and under a rural-urban continuum code of 9, based upon complete rural designation (Parker, 2013).

An information sheet outlining the purpose of the study (Appendix B) and a survey (Appendix C) were provided to all children attending the three participating elementary schools,

who took them home to give to their parents/caretakers. Those 18 years or older who are parents/caretakers of children attending the aforementioned elementary schools self-selected to participate. Children did not complete any portion of the survey.

### **Materials and Procedures**

As previously noted, the children attending the three elementary schools took home an envelope that contained the survey and information sheet. The parent or caretaker most responsible for food preparation was asked to complete the survey. A cookbook was sent home with the survey to encourage participation. Parent/caretakers were able to keep the cookbook, whether or not the survey was completed. Parents/caretakers were instructed to return completed surveys with the children. Surveys were collected at the school main offices, in collaboration with the school administration and faculty.

The packet sent home with children included an information sheet (Appendix B) outlining the purpose of the research and a survey (Appendix C). Names or any other identifying information were not on the survey, but subject numbers were assigned to participants. The survey included questions related to this thesis, as well as other validated measures and questions for additional research not related to this study. Questions related to this study are on pages 49-52 and 55-58 of Appendix C. Demographic information and self-reported height and weight were asked. BMI was calculated from self reported height (m) and weight (kg) by weight (kg) divided by height (m) squared. Parents or caretakers were also asked if any medical professional had ever told them that their child was overweight or obese in the last year. Participants also completed the 10-item, USDA Household Food Security Survey (Bickel et al., 2000).

### **Data Analysis**

Data were analyzed using IBM SPSS (version 23, 2015). A p-value of less than .05, selected a priori, was used to identify statistical significance. Differences in parent/caretaker BMI by household adult food security groups (ANOVA, Tukey Post Hoc), household adult food security status-(food-secure versus food-insecure, Independent Samples T-test), and household adult food security status (fully food secure versus not fully food secure, Independent samples T-test) were assessed. Further analyses were conducted to assess for the association between household adult food security scale score and parent/caretaker BMI (Pearson r Correlation).

Differences in parent/caretaker-reported child overweight/obesity by household adult food security status (food-secure versus food-insecure, Chi Square Test) and household adult food security status (fully food secure versus not fully food secure, Chi Square Test) were analyzed. Further analyses were conducted to assess the association between household adult food security scale score and parent/caretaker BMI (Pearson r correlation) and parent/caretaker-reported child overweight/obesity (Kendall’s tau<sub>b</sub> correlation). Table 2 summarizes the variables that were utilized, and Table 3 summarizes the research questions and corresponding statistical measures.

Table 2

*Variable Definition and Measurements*

Variable	Definition	Coding
Food Security Scale Score	Continuous, linear scale which measures the degree of severity of food insecurity/hunger experienced by a household in terms of a single numerical value.	0.0-7.7

Household Adult Food Security	<p>High Food Security had no reports of food access problems or limitations. Marginal Food Security had one or two reports, but little or no indication of changes in diets or food intake. Low Food Security had reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake. Very Low Food Security had reports of multiple indications of disrupted eating patterns and reduced food intake (USDA).</p>	<p>0=High food security 1-2=Marginal food security 3-5=Low food security 6-10=Very low food security</p>
Household Adult Food Security Status-Dichotomous (Food Secure versus Food Insecure)	<p>Food secure households had no problems or anxiety or had problems at times, or anxiety about, accessing adequate food, but the quality, variety, and quantity of their food intake were not substantially reduced (USDA).</p>	<p><b>0= ≤ 3 affirmative responses to U.S. Adult Food Security Survey Module (Food Secure)</b> <b>1= ≥ 3 affirmative responses to U.S. Adult Food Security Survey Module (Food Insecure)</b></p>
Household Adult Food Security Status-Modified Dichotomous (Fully Food Secure versus Not Fully Food Secure)	<p>Fully food secure households had no problems, or anxiety about, consistently accessing adequate food (USDA).</p>	<p>0=no affirmative responses to U.S. Adult Food Security Survey Module (Fully Food Secure) 1= ≥ 1 affirmative responses to U.S. Adult Food Security Survey Module (Not Fully Food Secure)</p>

Parent/caretaker Body Mass Index Category	<18.5-24.9: Normal 25-29.9: Overweight >30: Obese	0=Not overweight or obese 1=Overweight or obese
Parent/Caretaker Reported-Child Overweight/Obesity		1=Been told by a medical professional in the past year that your child is overweight or obese 2=Not been told by a medical professional in the past year that your child is overweight or obese.

Table 3

*Research Questions and Statistical Measures*

Question	Statistical Measure
Does parent/caretaker BMI differ between household adult food security groups?	ANOVA
Does parent/caretaker BMI differ between parent/caretakers living in food-secure and food-insecure households?	Independent Samples T-test
Does parent/caretaker BMI differ between parent/caretakers living in fully food-secure households and not fully food-secure households?	Independent Samples T-test
Does the prevalence of parent/caretaker-reported COWOB differ between food-secure and food-insecure households?	Chi Square Test
Does the prevalence of parent/caretaker-reported COWOB differ between fully food-secure and not fully food households?	Chi Square Test
Is there an association between household adult food security scale score and parent/caretaker BMI?	Pearson Correlation
Is there an association between household adult food security scale score and COWOB?	Kendall's tau <sub>b</sub> Correlation



## CHAPTER IV

### RESULTS

#### Sample Characteristics

Parent/caretaker participants (n=467/1144, 41% response rate) were 34±8 years and predominantly Caucasian (n=264/465, 57%), female (n=425/461, 92%), married (n=243/453, 54%), with some college or higher education (n=256/461, 56%), and living in food-secure households (n=367/455, 73%). Table 4 summarizes the characteristics of all parent/caretaker participants.

Table 4

*Gender, Race, Highest Level of Education Completed, Marital Status, and Household Food Security of Parent/Caretaker Participants*

Characteristic (n)	n	%
Gender (n=461)		
Female	425	92.2
Male	36	7.8
Race (n=465)		
American Indian Or Native American	1	0.2
Asian Native	3	0.6
Black or African American	141	30.3
Hispanic	54	11.6
White	264	56.8
Highest Level of Education Completed (n=461)		
Less than High School Education	72	15.6

High School Graduate or GED Equivalent	133	28.9
Some College or Higher	256	55.5
Marital Status (n=453)		
Married	243	53.6
Widowed	11	2.4
Divorced	52	11.5
Separated	18	4.0
Single/Never Married	129	28.5
Household Food Security (n=455)		
High Food Security <sup>ac</sup>	308	67.7
Marginal Food Security <sup>ad</sup>	59	13
Low Food Security <sup>bd</sup>	56	12.3
Very Low Food Security <sup>bd</sup>	32	7
Weight Status (n=307)		
Overweight or Obese	219	71.3
Not overweight or Obese	88	28.7

<sup>a</sup>Food-Secure

<sup>b</sup>Food-Insecure

<sup>c</sup>Fully Food-Secure

<sup>d</sup>Not Fully Food-Secure

Overall, 367 participants (80.6%) were food-secure, and 88 (19.3%) were food-insecure.

In addition, 308 participants (67.7%) were fully food-secure and 147 (32.3%) were not fully food-secure.

Children of participants (n=464) were 6.9±2.0 years and predominantly Caucasian (n=246/459, 49%) and in first grade (n=125/459, 25%). Table 5 summarizes the characteristics of the children of participants.

Table 5

*Gender, Race, and Grade of Children of Participants*

Characteristic (n)	n	%
Gender (n=460)		
Female	227	45
Male	233	46.1



Race (n=459)		
American Indian or Native Alaskan	2	0.4
Asian Native	6	1.2
Black or African American	172	34.1
Hispanic	30	5.9
Hawaiian or Other Pacific Islander	1	0.2
White	246	48.7
Other	2	0.4
Grade (n=459)		
K4	55	10.9
K5	52	10.3
1st	125	24.8
2nd	78	15.4
3rd	75	14.9
4th	43	8.5
5th	14	2.8
6th	17	3.4

### Food Security Status and Body Mass Index

Table 6 summarizes parent/caretaker BMI by household adult food security groups. Parent/caretaker BMI was significantly different between household food security groups ( $p=.002$ ), with those living in households characterized by marginal food security ( $p=.011$ ,  $32.5\pm 9.1$ ) and low food security ( $p=.033$ ,  $33.1\pm 7.5$ ) having a higher BMI than households characterized by high food security ( $28.5\pm 6.6$ ).

Table 6

#### *Parent/Caretaker Body Mass Index (kg/m<sup>2</sup>) by Household Adult Food Security Status*

	High Food Security n=206 (Mean $\pm$ SD )	Marginal Food Security n=39 (Mean $\pm$ SD )	Low Food Security n=35 (Mean $\pm$ SD )	Very Low Food Security n=22 (Mean $\pm$ SD )	p value <sup>a</sup>
Parent/Caretaker BMI	28.5 $\pm$ 6.6 <sup>b</sup>	32.5 $\pm$ 9.1 <sup>cd</sup>	33.1 $\pm$ 7.5 <sup>cd</sup>	30.9 $\pm$ 8.8 <sup>bc</sup>	.002

<sup>a</sup>One-way Analysis of Variance and Tukey Post Hoc test. Values with the same superscript are not significantly different from each other.

<sup>b</sup>High Food Security=Very Low Food Security,  $p = >.05$

<sup>c</sup>Marginal=Low=Very Low Food Security,  $p >.05$

<sup>d</sup>High < Marginal, Low Food Security,  $p <.05$

When stratified by food-secure (high, marginal) and food-insecure households (low, very low), parent/caretaker BMI was significantly higher ( $p=.02$ ) in food-insecure households ( $31.7\pm 8.0$ ), compared to food-secure households ( $29.2\pm 7.2$ ). Similarly, parent/caretaker BMI was significantly higher ( $p<.001$ ) in not fully food-secure households (marginal, low, very low food security) ( $32\pm 8.5$ ), compared to those in fully food-secure households (high food security) ( $28.5\pm 6.6$ ).

### **Food Security Status and Childhood Overweight/Obesity**

Table 7 summarizes the prevalence of caretaker-reported child overweight/obesity by food security status. The prevalence of caretaker-reported child overweight/obesity was significantly higher ( $p=.039$ ) in food-secure households ( $n=25$ , 6.8%), compared to food-insecure households ( $n=1$ , 1.1%). However, the prevalence of caretaker-reported child overweight/obesity did not differ ( $p=.857$ ) between fully food-secure households ( $n=18$ , 5.9%) and not fully food-secure households ( $n=8$ , 5.4%).

Table 7

#### *Caretaker-Reported Child Overweight/Obesity by Food Security Status*

	Overweight/Obese		Not Overweight/Obese		Total	p value
	n	%	n	%		
Food-Secure	25	6.8	341	93.1	366	.039
Food-Insecure	1	1.1	87	98.8	88	
Fully Food Secure	18	5.8	289	94.1	307	.857
Not Fully Food-Secure	8	5.4	139	94.5	147	

### **Relationship of Food Security Status to Variables of Interest**

There was a significant mild association ( $r=.182$ ,  $p=.002$ ) between parent/caretaker BMI and food security scale score. As food security score worsened, parent/caretaker BMI increased. However, there was not a significant association ( $\tau_b=.037$ ,  $p=.399$ ) between food security scale and caretaker-reported child overweight/obesity.

## CHAPTER V

### DISCUSSION

The study sought to determine the differences in parent/caretaker BMI and parent/caretaker-reported child overweight/obesity by food security status in a rural, Appalachian, Mississippi community, as well as the relationship of parent/caretaker BMI and parent/caretaker-reported child overweight/obesity to food security status. This research study helps to distinguish the prevalence of food insecurity and caretaker/child overweight/obesity in this specific part of Appalachian Mississippi, from the rest of the United States and Appalachian region, and to understand the relationship between food insecurity and the parent/caretakers and children living in those households. The relationship between food insecurity and obesity has been shown to have an association in portions of Appalachia, but Mississippi is not included in current research (Pheley et al., 2002; Dolstad et al., 2016) While the Appalachian Regional Commission does not include health status in its data, it is often difficult to determine health and food security status over such a wide, yet specific, region of the United States using current methods for estimates.

#### **Food Insecurity**

This study found that 19.3 percent of participants were food insecure, with 7.0 percent of those households being characterized with very low food security. While our sample may not be representative of the whole community, this is higher than that of both Mississippi (18.7 percent)

and the United States (12.3 percent), per 2016 national estimates (Coleman-Jensen et al., 2017). Because this specific part of Mississippi sits in the Appalachian region, there is reason to believe that such differences in food security may be related to specific regional concerns of the study community. These results are consistent with both Pheley, Holben, Graham, and Simpson (2002), in which respondents in a rural, Appalachian Ohio had greater rates of food insecurity, compared to state and national averages, and Dolstad, Woodward, Green, and Mcspirit (2016), where participants in rural, Appalachian Kentucky were classified as food-insecure at greater rates than state and national averages. These researchers found food insecurity rates higher than state and national averages at the times of those studies, although we cannot compare across years. Three separate communities, all spread throughout the Appalachian region have greater food insecurity than that of the United States, likely due to the distressed economic status that many of the communities in the Appalachian region experience. A counter argument is West Virginia, which is entirely located within Appalachia, has 14.9 percent of its households considered food-insecure, but is not considered to have the worst food-insecurity across the entire Appalachian region (Coleman-Jensen et al., 2017).

### **Parent/Caretaker Body Mass Index and Food Security Status**

The findings of this study support the hypothesis that caretaker BMI is different between households food security groups, with those households characterized by marginal and low food security having a higher BMI than those households characterized by high food security. In fact, any indication of food insecurity appears to negatively influence parent/caretaker BMI.

Further collapsing food security categories, the findings also support the hypothesis that there are differences of parent/caretaker BMI between food-secure and food-insecure

households, with those from food-insecure households having a higher BMI. Similarly, findings also support the hypothesis that parent/caretaker BMI is significantly higher in not fully food-secure households, compared to fully-food secure households, and that there was a mild, yet significant, association between household adult food security scale score and parent/caretaker BMI. As food security scale worsened, parent/caretaker BMI also increased.

Compared to the state of Mississippi, where 35.2 percent of adults are overweight and 35.5 percent of adults are obese, and the United States, where 36.5 percent adults are obese, our findings are significantly higher than the rates of both the state and country, in which 71.3 percent of parents/caretakers were overweight/obese. As indicated in Booth, Wei, and Little (2017), the food environment largely has an impact on obesity, which food insecurity could arguably be associated with the food environment. These findings are also consistent with Black and Nyasha (2014), indicating that lower rates of access to healthy food have higher rates of obesity, while the percentage of counties that are rural and living below the poverty line are significantly related to obesity rates. Pheley, Holben, Graham and Simpson (2002) also indicated an association between food-insecurity and self-reported poor health status in Appalachian Ohio. As the Appalachian Regional Commission classifies Calhoun County, Mississippi, with a “distressed” designation, the economic conditions probably influence the food security status of the household. Further, the USDA has prescribed a rural-urban continuum designation of 9, in which the county is completely rural and not adjacent to any metro areas, and a child persistent poverty designation, further confirming its economic status.

### **Child Overweight/Obesity and Food Security Status**

In looking at the children of study participants, findings support the hypothesis that there are differences in parent/caretaker-reported child overweight/obesity between food-insecure and food-secure households, but the prevalence was higher in food-secure households. Additionally, there was no difference in caretaker-reported child overweight/obesity between fully-food secure and not fully-food secure households, nor was there an association between household adult food security scale score and caretaker-reported child overweight/obesity. While child overweight and obesity has been found to have a higher prevalence in Appalachian youth in previous studies, it was not evident in our study stratified against food insecurity (Montgomery-Reagan, Bianco, Heh, Rettos, & Huston, 2009; Wang, Slawson, Relyea, Southerland, & Wang 2014). Furthermore, our study found that the prevalence of parent/caretaker-reported child overweight/obesity in both food-secure and food-insecure households is lower than both the state of Mississippi (13.2 percent child obesity) and that of the United States (17.5 percent for ages 6-11 and 20.5 percent ages 12-19) (Ogden, 2015). While some studies have found that children living in rural, food-insecure households may be exceeding their daily caloric intake, it is important to consider how food-insecurity largely affects the adult living in the household, rather than the child (Tovar et al., 2012).

### **Limitations**

While this study highlights important topics in relation to food insecurity and weight status of both child and parent/caretaker in the Appalachian region, there are some limitations. The primary limitation stems from self-report bias in regards to household food security status, caretaker-reported child overweight/obesity, and parent/caretaker self-reported height and weight. Additionally, body dissatisfaction and self-report bias has been associated with higher

incidences of overweight and obesity in some Appalachian populations, and the perception of child overweight/obesity may be culturally dependent (Tulkki, Berryman, Rana, Denham, Holben, Nisbett, 2006). Further, if a child was not taken to the doctor, he or she cannot be told that they are overweight/obese and those that went to the doctor may have had greater access to healthcare. The sample may also be biased, as those who returned surveys might be more motivated to return and participate in the study. Additionally, this study only included one county in Appalachian Mississippi and was a convenience sample from three schools in one school district, which may not be representative of all the community or Appalachian Mississippi. Lastly, while it was unlikely, one parent/caretaker may have appeared more than once in the data set, due to multiple children in the household returning surveys. However, asking for multiple surveys to be returned in the same envelope minimized this limitation.

## **Conclusion**

Addressing health disparities in Appalachia is vital. Although there are differences between parent/caretaker BMI and food security status noted within this sample, future efforts will need to examine the differences and relationship between more objective measures of food insecurity and weight or health status in other parts of the Appalachian region. Furthermore, many children living in food-insecure households qualify and receive food assistance from WIC and/or school breakfast/lunch programs; therefore, even if the household is food-insecure, the children necessarily not be food insecure. In further research, Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) or Supplemental Nutrition Assistance Program (SNAP) participation should be included as a part of the survey to identify which households were receiving food assistance. With this though, it would be important to explore



nutrition interventions, especially in a community hub (e.g., school, community health clinic), that may help to alleviate household food insecurity, especially for adults. Current research funded under the CDC by the 4-year Child Obesity Demonstration project specifically addresses childhood obesity interventions in diverse, lower-income communities, but the Appalachian region is not included in the project or the research (Dooyema, Belay, & Blanck, 2017). The economic distress of the Appalachian region seems to be the most common identifying factor across all communities in the region, distinguishing it from other areas of the United States. As the correlation between food security status and chronic disease among those living below the federal poverty line is strong, developing interventions that address the economic distress, with relation to food insecurity and nutrition, should be explored to help decrease the prevalence of chronic disease and obesity in this region of the United States (Gregory et al., 2017).

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## APPENDIX

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APPENDIX A: FOOD SECURITY MEASUREMENT

**Food Security Measurement Guide (Ten Item)**

Number of Positive Questions/ Responses	Scale Score	USDA Food Security Category	USDA Food Security Category (Dichotomous)	Fully Food Secure versus Not Fully Food Secure
0	0.0	High Food Security		Fully Food Secure
1	1.2	Marginal Food Security	Food Secure	
2	2.2			
3	3.0			
4	3.7	Low Food Security		
5	4.4			Not Fully Food Secure
6	5.0		Food Insecure	
7	5.7			
8	6.4	Very Low Food Security		
9	7.2			
10	7.7			

APPENDIX B: INFORMATION SHEET

# INFORMATION SHEET

**Title:** Farm-to-YOUth! Evaluation of a Produce Education Program for Youth and Families

<p><b>Investigators</b> David H. Holben, PhD, RDN, LD, FAND Sydney Antolini, Student Kelsey Reece, Student Michelle Weber, Students Department of Nutrition and Hospitality Management 108 Lenoir Hall The University of Mississippi (662) 915-1359</p> <p><b><u>ARE YOU 18 YEARS OF AGE OR OLDER?</u></b></p>	
--	--

*By checking this box I certify that I am 18 years of age or older.*

## **Description**

The purpose of this research project is to determine the effect of school-based food and nutrition education in Calhoun County, Mississippi, on both parents and elementary school children. Parents will complete a survey before and after the program, when enrolled into the study. Children will not complete a survey but will be asked to rate foods in the cafeteria. Food waste will also be observed before and after the program. Your name or any other identifying information will not be on the survey, but you will have a subject number so that we can link your pre- and post-study information. If you have more than one child enrolled in the elementary school, please return all surveys together.

## **Cost and Payments**

The pre- and post-surveys take about 10-minutes (each) to complete. Completing the survey means that you have enrolled into the study. You will not receive payment for participation, you will receive a cookbook with the pre-survey and a kitchen gadget with the post-survey. You will also receive education materials and kitchen gadgets during the program. Some children may also bring home produce for you to taste.

## **Risks and Benefits**



Parents: You may feel uncomfortable with some of the questions asked about the food situation in your household. For example, some questions ask if you worry about having enough money to buy food. We do not think that there are any other risks. A lot of people enjoy taking questionnaires. Information from the study may help to develop programs that benefit people in Mississippi and other areas of the country.

Children: When rating foods, some children may feel uncomfortable rating a food differently than a classmate. We do not think that there are any other risks. We do not anticipate any problems with food allergies in the cafeteria; however, the school nurse will be contacted if your child has an allergic reaction to a food.

### **Confidentiality**

No identifiable information will be recorded for you or your children, therefore we do not think you can be identified from this study. We do ask your address so that we can map how far you live from a supermarket.

### **Right to Withdraw**

You or your children do not have to take part in this study, and you may stop participation at any time. If you start the study and decide that you do not want to finish, all you have to do is to tell Dr. Holben or Ms. Antolini, Reece, or Weber in person, by letter, or by telephone (contact information listed above). You may skip any questions you prefer not to answer.

### **IRB Approval**

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or [irb@olemiss.edu](mailto:irb@olemiss.edu).

### **Statement of Consent**

I have read and understand the above information. By completing the survey, I consent to participate in the study.

APPENDIX C: PRE-SURVEY

**Farm-to-YOUth! Pre-Survey**

*This survey is intended to be completed by the parent/caretaker of the child bringing home the survey who is responsible for food preparation in the home. Completion of this survey is completely voluntary and may cease at any time. No one will be able to identify you in any report resulting from this survey.*

**Tell Us About You and Your Household.**

How old are you? _____	What is your gender? (Circle one answer)	Male	Female
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<b>What is your race? (Circle all that apply)</b>					
American Indian or Native Alaskan	Asian Native	Black or African American	Hispanic	Hawaiian or Other Pacific Islander	White
<b>Other (Please specify.)</b>					

<b>What is <u>your</u> highest level of education completed?</b>		<b>(Check one box only)</b>
<b>Less than High School</b>		
<b>High School Graduate – high school DIPLOMA or the equivalent (GED)</b>		
<b>Some College or Higher</b>		

<b>What is your current marital status? (Circle one answer)</b>				
Married	Widowed	Divorced	Separated	Single/Never Married
<b>If not married, do you have a live-in partner? Yes No</b>				

<b><u>Including you</u>, how many people live in your household?</b>	_____ Children less than 18 years of age	_____ Adults
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<b>What is <u>your</u> occupation type?</b>		<b>(Check one box only)</b>
Working full-time (35 or more hours per week)		
Working part-time (fewer than 35 hours per week)		
Unemployed		
Student (either full or part-time)		
Social Security Disability		
Applying for Social Security		
Retired		
Other (Please explain)		

<b>We are interested in how far you live from a grocery store? What is your address?</b>

<b>Do you currently have health insurance?</b>			<b>(Circle one answer)</b>
<b>No coverage/ self-pay</b>	<b>Medicaid or Medicare only</b>	<b>Private insurance only ( job/ school/ purchased)</b>	

<b>Do you belong to a church / religious group? (Circle one answer)</b>	Yes	No
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<b>Do you smoke cigarettes/ tobacco?</b>	Yes	No
<b>Does someone in your household smoke?</b>	Yes	No

In general my health is excellent, very good, good, fair, or poor. (Circle one answer)					
Excellent	Very Good	Good	Fair	Poor	
If you are a woman, were you ever diagnosed with gestational diabetes or given birth to a baby weighing nine pounds or more? (Circle one answer)			I am not a woman.	Yes	No
Do you have a mother, father, sister, or brother with diabetes?				Yes	No
Have you ever been diagnosed with high blood pressure? (Circle one answer)				Yes	No
Have you ever been diagnosed with type 1 diabetes? (Circle one answer)				Yes	No
Have you ever been diagnosed with type 2 diabetes? (Circle one answer)				Yes	No
Are you physically active? (Circle one answer)				Yes	No
How much do <u>you</u> weigh? _____			Find your height in the left column and then circle one box in the row. <u>If you weigh less than the range of the left column, just circle your height.</u>		

<b>Height</b>	<b>Weight (lbs.)</b>		
4' 10"	119-142	143-190	191+
4' 11"	124-147	148-197	198+
5' 0"	128-152	153-203	204+
5' 1"	132-157	158-210	211+
5' 2"	136-163	164-217	218+
5' 3"	141-168	169-224	225+
5' 4"	145-173	174-231	232+
5' 5"	150-179	180-239	240+
5' 6"	155-185	186-246	247+
5' 7"	159-190	191-254	255+
5' 8"	164-196	197-261	262+
5' 9"	169-202	203-269	270+
5' 10"	174-208	209-277	278+
5' 11"	179-214	215-285	286+
6' 0"	184-220	221-293	294+
6' 1"	189-226	227-301	302+
6' 2"	194-232	233-310	311+
6' 3"	200-239	240-318	319+
6' 4"	205-245	246-327	328+

**Tell Us About Your Food and Nutrition Habits and Behaviors.**

<b>I feel that I am helping my body by eating more fruits and vegetables.</b> (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
<b>I may develop health problems if I do not eat fruit and vegetables.</b> (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
<b>I feel that I can eat fruit or vegetables as snacks.</b> (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
<b>I feel that I can buy more vegetables the next time I shop.</b> (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
<b>I feel that I can plan meals or snack with more fruit during the next week.</b>	Agree (Yes)	Agree or Disagree	Disagree (No)

<b>(Circle one answer)</b>		<b>(Maybe)</b>	
<b>I feel that I can eat two or more servings of vegetables at dinner.</b> <b>(Circle one answer)</b>	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
<b>I feel that I can plan meals with more vegetables during the next week.</b> <b>(Circle one answer)</b>	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
<b>I feel that I can add extra vegetables to casseroles and stews.</b> <b>(Circle one answer)</b>	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
<b>In your household who is in charge of what foods to buy?</b> <b>(Circle one answer)</b>	I Am	Shared Decision	Other Person
<b>In your household who is in charge of how to prepare the food?</b> <b>(Circle one answer)</b>	I Am	Shared Decision	Other Person

<b>How would you best describe your diet? (Circle one answer)</b>				
Excellent	Very Good	Good	Fair	Poor

<b>Which one statement best fits you?</b>	<b>(Check one box only.)</b>
<b>I am not thinking about eating more fruit.</b>	<input type="checkbox"/>
<b>I am thinking about eating more fruit...planning to start within six months.</b>	<input type="checkbox"/>
<b>I am definitely planning to eat more fruit in the next month.</b>	<input type="checkbox"/>
<b>I am trying to eat more fruit now.</b>	<input type="checkbox"/>
<b>I am already eating 3 or more servings of fruit a day</b>	<input type="checkbox"/>

<b>Which one statement best fits you?</b>	<b>(Check one box only.)</b>
<b>I am not thinking about eating more vegetables.</b>	
<b>I am thinking about eating more vegetables...planning to start within six months.</b>	
<b>I am definitely planning to eat more vegetables in the next month.</b>	
<b>I am trying to eat more vegetables now.</b>	
<b>I am already eating 3 or more servings of vegetables a day.</b>	

<b>Do you eat more than one kind of fruit daily? (Circle only one.)</b>			
Never	Sometimes	Often	Always

<b>Do you eat more than 1 kind of vegetable in a day? (Circle only one.)</b>			
Never	Sometimes	Often	Always

<b>How many servings of vegetables do you eat each day?</b>	Number _____
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<b>Do you eat 2 or more servings of vegetables at your main meal? Sometimes, often, always, or never? (Circle one.)</b>			
Sometimes	Often	Always	Never

<b>Do you eat fruit or vegetables as snacks? (Circle one.)</b>	Yes	No
<b>How many servings of fruits do you eat each day?</b>	Number _____	

<b>Which one statement best fits you?</b>	<b>(Check one box only.)</b>
<b>I am not thinking about gardening to grow vegetables for my household.</b>	
<b>I am thinking about gardening to grow vegetables for my household. ...planning to start within six months</b>	



<b>I am definitely planning to garden to grow vegetables for my household in the next month.</b>	
<b>I am trying to garden to grow vegetables for my household.</b>	
<b>I am already gardening to grow vegetables for my household.</b>	

<b>Which one statement best fits you?</b>	<b>(Check one box only.)</b>		
<b>I am not thinking about gardening to grow fruits for my household.</b>			
<b>I am thinking about gardening to grow fruits for my household. ...planning to start within six months</b>			
<b>I am definitely planning to garden to grow fruits for my household in the next month.</b>			
<b>I am trying to garden to grow fruits for my household.</b>			
<b>I am already gardening to grow fruits for my household.</b>			

<b>Which of these statements best describes the food eaten in your household in the last 12 months?</b>	<b>(Check one box only.)</b>		
Enough of the kinds of food I/we want to eat			
Enough but not always the kinds of food I/we want			
Sometimes not enough to eat			
Often not enough			
Don't Know or Refused			
<b>Here are some reasons why people don't always have <u>enough to eat</u>. For each one, please tell me if that is a reason why YOU don't always have enough to eat.</b>	Yes	No	Don't Know
Not enough money for food			
Not enough time for shopping or cooking			
Too hard to get to the store			
On a diet			

No working stove available			
Not able to cook or eat because of health problems			

<b>Here are some reasons why people don't always have <u>the quality or variety of food they want</u>. For each one, please tell me if that is a reason why YOU don't always have the kinds of food you want to eat.</b>	Yes	No	Don't Know
Not enough money for food			
Kinds of food (I/we) want not available			
Not enough time for shopping or cooking			
Too hard to get to the store			
On a special diet			

<b>In the past 12 months, (I/we) worried whether (my/our) food would run out before (I/we) got money to buy more.</b>			
<b>(Circle only one.)</b>			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

<b>In the past 12 months, the food that (I/we) bought just didn't last, and (I/we) didn't have money to get more.</b>			
<b>(Circle only one.)</b>			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

<b>In the past 12 months, (I/we) couldn't afford to eat balanced meals.</b>			
<b>(Circle only one.)</b>			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

<p><b>In the past 12 months, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?</b></p> <p style="text-align: right;"><b>(Check one box only)</b></p>				
Yes. Almost every month	Yes. Some months but not every month	Yes. Only 1 or 2 months	No.	Don't Know or Prefer Not to Answer

<p><b>In the past 12 months, did you (personally) ever eat less than you felt you should because there wasn't enough money to buy food?</b></p> <p style="text-align: right;"><b>(Check one box only)</b></p>		
Yes	No	Don't Know or Prefer Not to Answer

<p><b>In the past 12 months, were you (personally) ever hungry but didn't eat because you couldn't afford enough food?</b></p> <p style="text-align: right;"><b>(Check one box only)</b></p>		
Yes	No	Don't Know or Prefer Not to Answer

<p><b>In the past 12 months, did you (personally) lose weight because you didn't have enough money for food?</b></p> <p style="text-align: right;"><b>(Check one box only)</b></p>		
Yes	No	Don't Know or Prefer Not to Answer

<p><b>In the past 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?</b></p> <p style="text-align: right;"><b>(Check one box only)</b></p>				
Yes. Almost every month	Yes. Some months but not every month	Yes. Only 1 or 2 months	No.	Don't Know or Prefer Not to Answer

**Tell Us More About the Child who Brought This Home From School.**

What is the child's age? _____	What grade is the child in? _____	
What is your child's gender? (Circle one answer)	Male	Female

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<b>What is your child's race? (Circle all that apply)</b>					
American Indian or Native Alaskan	Asian Native	Black or African American	Hispanic	Hawaiian or Other Pacific Islander	White
<b>Other (Please specify.)</b>					

<b>In the past year, have you been told by a medical professional that your child is overweight or obese? (Circle one answer)</b>	Yes	No
<b>In the past year, have you been told by a medical professional that your child has low iron? (Circle one answer)</b>	Yes	No
<b>In the past year, has your child ever been in trouble at school for behavior problems? (Circle one answer)</b>	Yes	No
<b>In the past year, has your child seen the school counselor or another counselor/medical professional for anxiety, depression, behavioral, or psychological problems? (Circle one answer)</b>	Yes	No

<b>In general my <u>child's</u> health is excellent, very good, good, fair, or poor. (Circle one answer)</b>				
Excellent	Very Good	Good	Fair	Poor

<b>How would you best describe your <u>child's</u> diet? (Circle one answer)</b>				
Excellent	Very Good	Good	Fair	Poor

<b>Does <u>your child</u> eat more than one kind of fruit daily? (Circle only one.)</b>			
Never	Sometimes	Often	Always

<b>Does <u>your child</u> more than 1 kind of vegetable in a day? (Circle only one.)</b>
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Never	Sometimes	Often	Always
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<b>How many servings of vegetables <u>does your child</u> eat each day?</b>	Number _____
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<b>Does <u>your child</u> eat 2 or more servings of vegetables at your main meal? Sometimes, often, always, or never?</b>			
<b>(Circle one.)</b>			
Sometimes	Often	Always	Never

<b>How many servings of fruits <u>does your child</u> eat each day?</b>	Number _____
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Thank you for participating in our survey!

## VITA

SYDNEY ANTOLINI

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### EDUCATION

M.S., Food and Nutrition Science, University of Mississippi, May 2018

Concentration: Child and Adolescent Nutrition

Thesis: Food Insecurity and Child and Parent/Caretaker Overweight/Obesity in Rural, Appalachian Mississippi Community

B.S., Dietetics, University of Dayton, May 2016

Thesis: Effects of a Peer Developed Nutrition Education Intervention on the Fruit and Vegetable Intake in Elementary School Children

### ACADEMIC EMPLOYMENT

Graduate Assistant, Nutrition and Hospitality Management,  
University of Mississippi. August 2016-May 2017.

Teaching Assistant, Health and Sports Science,  
University of Dayton. August 2014-May 2015

### HONORS AND FELLOWSHIPS

University of Dayton Honors Program, 2012-2016

### PUBLICATIONS and PRESENTATIONS

Antolini, S., Reece, K., Weber, M., Holben, D., Food Insecurity and Child and Parent/Caretaker Overweight/Obesity in Rural, Appalachian Mississippi Community. Northeastern Mississippi Academy of Nutrition and Dietetics Annual Conference, Meridian, Mississippi. 26 March 2018.

Antolini, S., Reece, K., Weber, M., Holben, D. Food Insecurity and Child and Parent/Caretaker Overweight/Obesity in Rural, Appalachian Mississippi Community. Academy of Nutrition and Dietetics Food and Nutrition Conference and Exposition, Chicago, IL, 21 October 2017.

Antolini, S., Cuy-Castellanos, D., Effects of a Peer Developed Nutrition Education Intervention on the Fruit and Vegetable Intake in Elementary School Children. Ohio State University Russell Klein Nutrition Symposium, Columbus, Ohio, April 2016.

Antolini, S., Cuy-Castellanos, D., Effects of a Peer Developed Nutrition Education Intervention on the Fruit and Vegetable Intake in Elementary School Children. University of Dayton Honors Standar Symposium. Dayton, Ohio, April 2016.